

FRONT BRAKE OF AN ELECTRIC MOTOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 This invention relates to the front brake of an electric motor, particularly to one having a simple mechanical structure to effectively control an electric motor and able to save cost.

2. Description of the Prior Art

10 A conventional electric motor 1 having function of braking and speed reducing, as shown in Fig. 1, is installed with an electromagnetic brake 2 at the rear side to control its shaft to carry out braking. That the electromagnetic brake 2 is installed at the rear side of
15 the conventional electric motor 1 is mainly because the electric motor 1 has its front side provided with a speed-reducing device 3 to lower the speed and heighten the torsion of the output power of the electric motor 1 to let the spindle 4 at the front side of the electric motor 1
20 able to output a comparatively great power to drive the mechanical equipment connected with it. Under such a condition, after the speed-reducing device 3 carries out speed reduction, the spindle 4 will produce a torsion which is too huge to be braked by the electromagnetic
25 brake 2; therefore the conventional electric motor 1 must have its electromagnetic brake 2 installed at the rear side so as to brake the shaft directly, thus increasing

dimensions of the electric motor 1 and taking much space.

SUMMARY OF THE INVENTION

The objective of the invention is to offer a front
5 brake of an electric motor, having mechanical structure
and connected with an output spindle at the front end of
an electric motor, diminishing the dimensions of an
electric motor and saving cost and also having no
problem involving circuit and electric source in
10 maintenance.

Besides, the electromagnetic brake 2 of the
conventional electric motor 1 is supplied with direct
current for carrying out operation, but for the present
almost all the factories and families are supplied with
15 alternating current for use; therefore the
electromagnetic brake 2 has to be additionally provided
inside with a rectifier to convert alternating current into
direct current and a control circuit, thus complicating
its structure and increasing cost.

20 BRIEF DESCRIPTION OF DRAWINGS

This invention will be better understood by
referring to the accompanying drawings, wherein:

Fig. 1 is a perspective view of a conventional
electric motor:

25 Fig 2 is an exploded perspective view of a first
preferred embodiment of the front brake of an electric
motor in the present invention:

Fig. 3 is a cross-sectional view of the first preferred embodiment of the front brake of an electric motor in the present invention:

Fig. 4 is a side cross-sectional view of the first preferred embodiment of the front brake of an electric motor in the present invention:

Fig. 5 is a side cross-sectional view of the first preferred embodiment of the front brake of an electric motor in the present invention, showing the spring constricted inward:

Fig. 6 is a side cross-sectional view of the first preferred embodiment of the front brake of an electric motor in the present invention, showing the spring expanded outward:

Fig. 7 is a perspective view of the first preferred embodiment of the front brake of an electric motor applied for pulling up a curtain in the present invention:

Fig. 8 is a front view of a second preferred embodiment of the front brake of an electric motor in the present invention:

Fig. 9 is a front view of a third preferred embodiment of the front brake of an electric motor in the present invention:

Fig. 10 is an exploded perspective view of a fourth preferred embodiment of the front brake of an electric motor in the present invention: and

Fig. 11 is an exploded perspective view of a fifth

preferred embodiment of the front brake of an electric motor in the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

5 A first preferred embodiment of the front brake of an electric motor in the present invention, as shown in Figs. 2 and 3, includes an electric motor 10, a shaft coupling rotary disc 20 and a brake 30 as main components combined together.

10 The electric motor 10 has a speed-reducing device 101 assembled at the front side, and the speed-reducing device 101 is provided with a power output spindle 11 extending outward at the front end for output of power and having its outer circumference fitted with a sleeve
15 12.

 The shaft coupling rotary disc 20 has its outer circumferential edge provided with a plurality of engage members 21 extending forward and spaced apart equidistantly. The shaft coupling rotary disc 20 further
20 has a recessed groove 22 and a through shaft hole 23 axially bored in the center. The shaft hole 23 and the spindle 11 have the same shape and are united with each other to rotate together.

 The brake 30, as shown in Fig. 4, includes a base
25 31, a drive rod 32 and a controlling rotary member 33 combined together.

 The base 31 shaped a hollow pillar has a round

base hole 311 axially bored in the center for receiving a torsion spring 312 therein. The torsion spring 312 has two ends respectively bent inward to form an actuating member 313. Further, the base hole 311 of the base 31
5 has its opposite sides respectively covered by a sealing cover 314 having an axial insert hole 315 in the center.

The drive rod 32 shaped as an elongate column is positioned inside the torsion spring 312 after having its front inserted through the pivotal insert hole 315 of the
10 front sealing cover 314. The drive rod 32 is provided with a protruding drive member 321 on a central portion to push against the outer side of the actuating member 313 of the torsion spring 312.

The controlling rotary member 33 is axially bored
15 with a pivotal shaft hole 331 in the center and has its rear circumference formed with a serrated portion 332 to be engaged with the engage members 21 of the shaft coupling rotary disc 20. The front portion of the controlling rotary member 33 to be inserted in the base
20 hole 311 of the base 31 has its opposite side edges respectively and symmetrically formed with an interacting surface 333 to push against the inner side of the actuating member 313 of the torsion spring 312. The drive rod 32 is pivotally inserted through the pivotal
25 shaft hole 331 of the controlling rotary member 33 and has its drive member 321 protruding out of the pivotal shaft hole 331.

In assembling, as shown in Fig. 3, the shaft coupling rotary disc 20 is fitted with the front side of the electric motor 10, letting the spindle 11 inserted through the shaft hole 23 of the shaft coupling rotary disc 20. Then, the engage members 21 of the shaft coupling rotary disc 20 are engaged with the serrated portion 332 of the controlling rotary member 33 to assemble the shaft coupling rotary disc 20 together with the brake 30.

10 In using, as shown in Fig. 7, if the electric motor 10 of this invention is to be installed with a moving-up and-down curtain unit 40, the base 31 in front of the electric motor 10 is fitted in the rail frame 41 of the curtain unit 40 and connected to the rolling shaft 44 of the curtain unit 40 by means of a connecting sleeve 42 and a connecting rod 43, letting the drive rod 32 connected with the rolling shaft 44 of the elevating curtain 40 so as to actuate the curtain unit 40 to move up and down.

20 In operating, as shown in Fig. 5, when the electric motor 10 is started and the spindle 11 begins to rotate, the spindle 11 will actuate the interacting surfaces 333 of the controlling rotary member 33 to rotate clockwise or counterclockwise. When the interacting surfaces 333 of the controlling rotary member 33 is rotated to push against the inner side of one actuating member 313 of the torsion spring 312, the torsion spring 312 will be forced

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to constrict inward and separate from the inner circumferential edge of the base hole 311 of the base 31, letting the torsion spring 312 lose its expanding resilience. At this time, the controlling rotary member
5 33 will actuate the drive rod 32 to rotate together with the connecting rod 43 and the rolling shaft 44 of the curtain unit 40 to enable the curtain body 45 to move up and down. On the contrary, as shown in Fig. 6, when the electric motor 10 stops rotating, the curtain body 45 will
10 hang down due to its own gravity and actuate the rolling shaft 44, the connecting rod 43, the connecting sleeve 42 and the drive rod 32 to rotate. At this time, the drive member 321 of the drive rod 32 will push the outer side of one actuating member 313 of the torsion spring 312
15 and force the torsion spring 312 to expand outward and closely push against the inner wall of the base hole 311 of the base 31 to form a braking function, letting the controlling rotary member 33 and the drive rod 32 as well as the connecting rod 43 stop rotating and the
20 curtain body 45 impossible to move downward.

Thus, the power driven by the electric motor 10 can be controlled to actuate the curtain body 45 to move up and down by constricting the torsion spring 312 inward, or controlled to stop the curtain body 45 from
25 moving downward due to its own gravity (or an external force) by expanding the torsion spring 312 outward.

A second preferred embodiment of the front brake

of an electric motor 10 in the present invention, as shown in Fig. 8, is to have a gear 50 fitted on the spindle 11 of the electric motor 10. The gear 50 is directly engaged with the serrated portion 332 (equivalent to a gear) of the controlling rotary member 33. The power driven by the electric motor 10 in the second preferred embodiment has the same actuating and braking function and effect as those described in the first preferred embodiment.

10 A third preferred embodiment of the front brake of an electric motor in the present invention, as shown in Fig. 9, is to have a belt pulley 50 (gear-like) fitted on the spindle 11 of the electric motor 10. The belt pulley 50 is separated from the controlling rotary member 33 for a certain distance and they are connected to each other by a transmission belt 51. The teeth 52 of the transmission belt 51 (time-scale belt) and the gear 50 and the serrated portion 332 of the controlling rotary member 33 are engaged with one another. Thus, the electric motor 10 can be assembled with different mechanical devices in various ways, convenient in assembling and using. The power driven by the electric motor 10 in this preferred embodiment has the same actuating and braking function and effect as those described in the first preferred embodiment.

25 A fourth preferred embodiment of the front brake of an electric motor in the present invention, as shown in

Fig. 10, is to have the front surface of the controlling rotary member 34 bored with plural insert holes 341, and one side of the shaft coupling rotary disc 24 provided with plural projecting studs 241 to be inserted in the insert holes 341 to combine the shaft coupling rotary disc 24 together with the controlling rotary member 34, equally enabling the electric motor 10 to actuate the brake to function.

A fifth preferred embodiment of the front brake of an electric motor in the present invention, as shown in Fig. 11, includes an electric motor 10, a shaft coupling rotary disc 20 and a brake 30 combined together. The structure of the brake 30 in the fifth preferred embodiment is almost the same as that in the first preferred embodiment, except that one sealing cover 314 (a) is formed integral on the front side of the base 31 and the other sealing cover 314 (a) is movably covered on the rear side of the base 31. The two sealing covers 314 (a) are respectively and axially bored with a pivotal insert hole 315 (a) in the center.

While the preferred embodiments of the invention have been described above, it will be recognized and understood that various modifications may be made therein and the appended claims are intended to cover all such modifications that may fall within the spirit and scope of the invention.